

Voggite

Na₂Zr(PO₄)(CO₃)(OH)·2H₂O

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Crystal Data: Monoclinic. *Point Group:* 2/m. Needlelike pseudo-hexagonal crystals, elongated along [010], showing {100}, { $\bar{1}01$ }, {001}, to 1 mm, in hairlike mats.

Physical Properties: *Cleavage:* {010}, poor. *Tenacity:* Brittle. Hardness = n.d.
D(meas.) = 2.70(2) D(calc.) = 2.704 Blue cathodoluminescence under the electron beam.

Optical Properties: Transparent to translucent. *Color:* Colorless to white. *Streak:* White.
Luster: Vitreous.

Optical Class: Biaxial (+). *Orientation:* X = b; Z \wedge a = 22°. *Dispersion:* r \ll v, strong.
 $\alpha = 1.569(1)$ $\beta = 1.594(1)$ $\gamma = 1.622(1)$ 2V(meas.) = 81(5)° 2V(calc.) = 88°

Cell Data: *Space Group:* I2/m. a = 12.261(2) b = 6.561(1) c = 11.757(2)
 $\beta = 116.19(2)^\circ$ Z = 4

X-ray Powder Pattern: Francon quarry, Canada.
10.2 (100), 5.58 (80), 3.89 (65), 4.06 (60), 3.281 (60), 2.546 (40), 2.039 (40)

Chemistry:	(1)	(2)
P ₂ O ₅	25.9	20.56
CO ₂	12.	12.75
ZrO ₂	43.3	35.69
Na ₂ O	7.4	17.95
H ₂ O	15.	13.05
Total	103.6	100.00

(1) Francon quarry, Canada; by electron microprobe, with severe decomposition; CO₂ and H₂O by TGA. (2) Na₂Zr(PO₄)(CO₃)(OH)·2H₂O from crystal-structure analysis.

Occurrence: Very rare, in cavities in an altered amygdaloidal basalt dike intruding a zirconium-bearing silicocarbonatite sill in a limestone quarry.

Association: Dawsonite, calcite, quartz.

Distribution: Found in the Francon quarry, Montreal Island, Montreal, Quebec, Canada.

Name: Honoring Adolf Vogg (1931–), Canadian amateur mineralogist who collected the original specimens.

Type Material: Canadian Geological Survey, Ottawa, Canada, NMC 65631.

References: (1) Roberts, A.C., A.P. Sabina, T.S. Ercit, J.D. Grice, J.T. Szymański, and R.A. Ramik (1990) Voggite, a new hydrated Na–Zr hydroxide-phosphate-carbonate from the Francon quarry, Montreal, Quebec. *Can. Mineral.*, 28, 155–159. (2) (1990) *Amer. Mineral.*, 75, 1434 (abs. ref. 1). (3) Szymański, J.T. and A.C. Roberts (1990) The crystal structure of voggite, a new hydrated Na–Zr hydroxide-phosphate-carbonate mineral. *Mineral. Mag.*, 54, 495–500.